

Lesson 7 - Lewis Structure of Polyatomic Ions

Review of Drawing Lewis Structures:

- Remember to show ALL valence electrons
- Example: BeCl_2



Steps	Lewis Structure
1. Find total number of valence electrons	Be: 2 $v.e$ Cl: 7 $v.e$ Total: $2 + 2 \times 7 = 16 v.e^-$
2. Draw skeleton structure <ul style="list-style-type: none">Central atom in the middleRemaining atoms surrounding the central atomLink central atom to all surrounding atoms	$\text{Cl} - \text{Be} - \text{Cl}$
3. Satisfy octet of surrounding atoms	$:\ddot{\text{Cl}} - \text{Be} - \ddot{\text{Cl}}:$
4. Remaining valence electrons <ul style="list-style-type: none">Any remaining valence electrons are put on the central atom	$\# \text{left} = 16 - 16 = 0$ $:\ddot{\text{Cl}} - \text{Be} - \ddot{\text{Cl}}:$
5. Tag central atom's valence electrons	$:\ddot{\text{Cl}} - \text{Be} - \ddot{\text{Cl}}:$

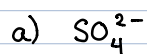
BeCl_2 is an example of: an incomplete octet

Drawing Lewis Structures for Polyatomic Ions:

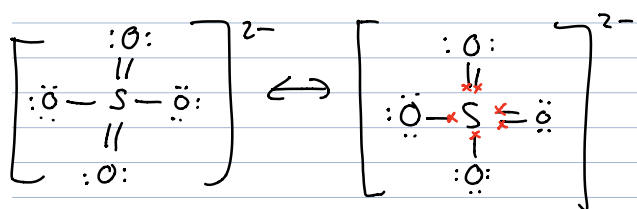
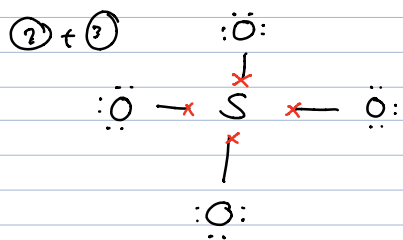
- Looking at charged molecules (NH_4^+ , CO_3^{2-} , etc.)
- Need to take charge into account when drawing the Lewis structure of polyatomic atoms
 - If a positive charge (cation): remove an e^- from total v.e
 - If a negative charge (anion): add an e^- to total v.e
- Example: ClO_2^-

Steps	Lewis Structure
1. Find total number of valence electrons	Cl: 7 v.e O: 6 v.e Total: $7 + 2 \times 6 + 1 = 20$
2. Draw skeleton structure <ul style="list-style-type: none"> Central atom in the middle Remaining atoms surrounding the central atom Link central atom to all surrounding atoms 	$\text{O} - \text{Cl} - \text{O}$
3. Satisfy octet of surrounding atoms	$:\ddot{\text{O}} - \text{Cl} - \ddot{\text{O}}:$
4. Remaining valence electrons <ul style="list-style-type: none"> Any remaining valence electrons are put on the central atom 	$\#e^- = 20 - 16 = 4$ $:\ddot{\text{O}} - \ddot{\text{Cl}} - \ddot{\text{O}}:$
5. Tag central atom's valence electrons	$:\ddot{\text{O}} - \overset{\times \times}{\text{Cl}} - \ddot{\text{O}}:$ $[\ddot{\text{O}} - \ddot{\text{Cl}} = \ddot{\text{O}}]^- \leftrightarrow [\ddot{\text{O}} = \ddot{\text{Cl}} - \ddot{\text{O}}]^-$ <i>resonance structures.</i>

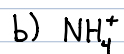
Try the following:



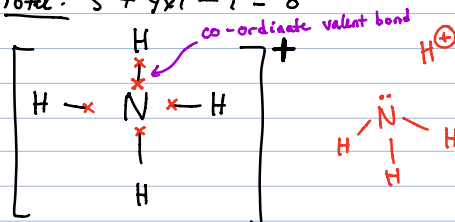
① Total: $6 + 4 \times 6 + 2 = 32$



There are two other resonance structures possible...



① Total: $5 + 4 \times 1 - 1 = 8$



* use EN to find which atom will lose an e^- .

